

### **Remarks/Arguments**

The applicant has amended claims 1-4 to make explicit the bonding of each of the successive layers of photosensitive materials to prior layers. While this feature was inherent in the preamble's recitation of "a method for making three dimensional structures" and in the chemical behavior of the photosensitive materials disclosed and claimed by the applicant, the added specificity more clearly defines the invention, and more clearly distinguishes the present invention from the prior art cited by the examiner. The formation of three dimensional structures with successive layers bonded to one and another is disclosed at the final paragraph of page 4 of the specification, and in the example shown in the detailed description of the invention. No new matter is added by this amendment. The applicant has cancelled claims 11, 12 and 14. The applicant has amended claims 13 and 15 to recite dependency from claim 5 and has amended claim 4 to recite dependency from claim 3.

### **35 USC 112 second paragraph**

The examiner has rejected claims 4, and 11-15 under 35 USC 112, second paragraph. With respect to claim 4, the examiner notes that the "third layer" has no antecedent basis, and the examiner conducted the examination assuming the third layer to be a third layer of photosensitive materials. The examiner was correct in this assumption, and the applicant has amended claim 4 to recite dependency from claim 3, and to recite that the step of removing the layer of a sacrificial material subsequent to the addition of each of the successive layers described and claimed in claim 3. The examiner has objected to the use of tradenames in each of claims 11, 12, and 14. The applicant has cancelled the claims, rendering such rejection moot. Finally, the examiner has noted that claims 13 and 15 should be amended to recite dependency to claim 5. The

applicant has amended the claims to recite the proper dependency as suggested by the examiner.

**35 USC 102(b)**

The examiner has rejected claims 2-4, 20-23, 27 and 28 under 35 USC 102(b) as being anticipated by Conlon (USP 5,035,939). Conlon, however, is readily distinguished from the present invention because Conlon covers the entire device with the barrier layer (which the examiner has termed a “sacrificial layer” to relate the Conlon reference to the pending claims). The examiner’s attention is drawn to figures 3, 4 and 5, wherein Conlon shows the barrier layer completely covering the prior layers. Conlon describes this coverage at column 3, lines 50-55 wherein Conlon makes plain that the purpose of the barrier layer is to for “a barrier between the dielectric layer and a subsequently applied conductor layer.” As the examiner will readily recognize, Conlon cannot allow the dielectric layer and a subsequently applied conductor layer to come into contact, as this will produce an electrical short, ruining the printed circuit boards Conlon is attempting to create, and rendering them inoperable. Thus, it is not a bit surprising that in both the figures and the written description Conlon shows and describes the barrier layer as completely separating the layers below and above the barrier layer.

The present invention requires the opposite. As originally claimed by the applicant, the sacrificial layer is described as only applied within at least a portion of the voids formed in the prior layer of photosensitive material, thereby allowing areas of the photosensitive material that were not formed into voids to come into direct contact with subsequent layers of photosensitive material. Within this amendment the applicant has amended the claims to make this concept more explicit, however, as originally claimed, and particularly when read in light of the specification, it was clear that the applicant’s sacrificial layer was not to provide

complete separation between successive layers of the photosensitive material, as this would prevent the formation of the complex three dimensional structures formed of the successive layers of photoresistive materials that is the point of the applicant's invention. As noted above, Conlon does not allow these subsequent layers to come into contact. Indeed, Conlon *cannot* allow them to come into contact, as doing so would create an electrical pathway between the dielectric layer and a subsequently applied conductor layer, thereby ruining the circuit Conlon is trying to make.

Conlon cannot, therefore, possibly form the basis for a *prima facie* case of anticipation under 35 USC 102(b), as Conlon fails to teach both the steps of "providing a second layer of photosensitive material on top of said layer of a sacrificial material and in contact with at least a portion of said first layer" and the step of bonding successive layers of photoresistive materials, as is required in claims 2, 3, 4, and all remaining claims by virtue of dependency. As it is axiomatic that a proper rejection under 35 U.S.C. 102(e) must contain each and every limitation of the claim, ("[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under consideration" W.L. Gore & Assocs. V. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983), and it is plain that Conlon not only does not contain this feature, but in fact requires the exact opposite, the applicant respectfully requests that the examiner remove his rejection of claims 2-4, 20-23, 27 and 28 under 35 USC 102(b).

### **35 USC 103(a)**

The examiner has rejected claims 5-15 and 26 under 35 USC 103(a) as being obvious in view of Conlon (USP 5,035,939) and further in view of Finter (USP 6,001,428). The examiner concedes that Conlon is silent with respect to the use of a photosensitive composition, and does not disclose the limitations of claims 5-15 and 26. However, the examiner notes that Finter describes epoxy resins cross-

linkable with UV rays. The applicant readily agrees that the photosensitive materials used in the applicant's method were well known prior to the applicant's disclosure. Indeed, the photosensitive materials used in the proof of principle experiments described in the applicant's detailed description of the invention were commercially available at the time of the disclosure. However, the mere existence of these materials does nothing to teach or suggest that they may be used in the manner taught by the applicant. When considering the claims as a whole, it is apparent that while Finter may disclose the materials, Finter contains no teaching or suggestion whatsoever of how these materials might be used to form three dimensional microstructures. Finter neither teaches nor suggests the steps of "creating voids" in a first layer, "removing material present in the voids", "providing a layer of sacrificial material within at least a portion of said voids", or "providing a second layer of photosensitive material on top of the layer of a sacrificial material and in contact with at least a portion of said first layer." For each of these steps, the examiner must rely exclusively on the teachings of Conlon. As has already been shown in the applicant's comments above, Conlon in fact teaches away from the claimed method, as Conlon not only shows complete coverage with the sacrificial layer, but in fact requires complete coverage for the printed circuit boards of Conlon to operate successfully. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). Since Finter neither teaches nor suggests any of the features of the claims recited above, and since Conlon explicitly teaches away from those features as already discussed, the combination of Finter and Conlon cannot possibly form the basis for a *prima facie* showing of obviousness under 35 USC 103(a). Accordingly, the applicant respectfully requests that the examiner remove

his rejection of claims 5-15 and 26 under 35 USC 103(a) as being obvious in view of Conlon (USP 5,035,939) and in view of Finter (USP 6,001,428).

The examiner has rejected claims 16, 17, and 20-25 and 26 under 35 USC 103(a) as being obvious in view of Conlon (USP 5,035,939) and further in view of DeSimone (USP 6,298,902). The examiner concedes that Conlon does not disclose using a fluoropolymer for the sacrificial layer. However, the examiner notes that DiSimone teaches a method for using CO<sub>2</sub>-soluble materials as transient coatings. The examiner further notes that DiSimone teaches that a three dimensional structure may be formed of the CO<sub>2</sub> soluble materials discussed by DiSimone by first providing a corresponding cavity of a three dimensional structure that is NOT CO<sub>2</sub> soluble. What the examiner fails to recognize in reciting this teaching of DeSimone is that DeSimone treats the three dimensional structure of the non-CO<sub>2</sub> soluble material as a *given*. DeSimone offers no teaching or suggestion whatsoever as to how this three dimensional structure of non-CO<sub>2</sub> soluble material is created. Instead, DiSimone simply assumes that it exists, and notes that it may then be used as a template in creating a corresponding structure made of DiSimone's non-CO<sub>2</sub> soluble materials. There is no reason whatsoever to assume that the three dimensional structures referred to in DeSimone were fabricated in any manner remotely resembling method of the present invention, beyond the fact that the end products both have three dimensions.

The applicant also readily agrees that the CO<sub>2</sub> soluble materials used in the applicant's method were well known prior to the applicant's disclosure. Indeed, while the CO<sub>2</sub> soluble materials used in the proof of principle experiments were described in the applicant's detailed description of the invention were fabricated by the applicant, as disclosed by the applicant, the methods for such fabrication were known by those having skill in the art, and at least some of the materials the applicant indicated as being suitable for this purpose were commercially available

at the time of the disclosure. However, the mere existence of these materials does nothing to teach or suggest that they may be used in the manner taught by the applicant.

When considering the claims as a whole, it is apparent that while DeSimone may disclose CO<sub>2</sub> soluble materials, DeSimone contains no teaching or suggestion whatsoever of how these materials might be used to form three dimensional microstructures. Indeed, DeSimone completely ignores the possibility that the CO<sub>2</sub> soluble materials could be used to fabricate non-CO<sub>2</sub> soluble three dimensional structures, as DiSimone treats the existence of these structures as a given.

DeSimone thus neither teaches nor suggests the steps of “creating voids” in a first layer, “removing material present in the voids”, “providing a layer of sacrificial material within at least a portion of said voids”, or “providing a second layer of photosensitive material on top of the layer of a sacrificial material and in contact with at least a portion of said first layer.” DeSimone neglects these steps because DeSimone is not fabricating a three dimensional structure made from non-CO<sub>2</sub> soluble structures. As noted above, DeSimone treats the prior existence of such a structure as a given. For each of these steps, the examiner again must rely exclusively on the teachings of Conlon. As has already been shown in the applicant’s comments above, Conlon in fact teaches away from the claimed method, as Conlon not only shows complete coverage with the sacrificial layer, but in fact requires complete coverage for the printed circuit boards of Conlon to operate successfully. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). Since DeSimone

neither teaches nor suggests any of the features of the claims recited above, and since Conlon explicitly teaches away from those features as already discussed, the combination of DeSimone and Conlon cannot possibly form the basis for a *prima facie* showing of obviousness under 35 USC 103(a). Accordingly, the applicant respectfully requests that the examiner remove his rejection of claims 16, 17, and 20-25 and 26 under 35 USC 103(a) as being obvious in view of Conlon (USP 5,035,939) and further in view of DeSimone (USP 6,298,902).

The examiner has rejected claims 18-23 under 35 USC 103(a) as being obvious in view of Conlon (USP 5,035,939) in view of DeSimone (USP 6,298,902) and further in view of Jur (USP 6,558,475). The examiner concedes that DeSimone does not disclose using a co-solvent for dissolving the fluoropolymer sacrificial layer. However, the examiner notes that Jur teaches that suitable co-solvents for use with a cleaning medium of a supercritical carbon dioxide, include fluorocarbons, ethers and hydrocarbons. However, such disclosure is not sufficient to overcome the deficiencies of DeSimone and Conlon.

The applicant also readily agrees that the co-solvents used in the applicant's method were well known prior to the applicant's disclosure. However, the mere existence of these materials does nothing to teach or suggest that they may be used in the manner taught by the applicant.

When considering the claims as a whole, it is apparent that while DeSimone may disclose CO<sub>2</sub> soluble materials, and Jur may disclose suitable co-solvents for these materials, neither DeSimone nor Jur contain any teaching or suggestion whatsoever of how these materials might be used to form three dimensional microstructures. Indeed, as discussed above, DeSimone completely ignores the possibility that the CO<sub>2</sub> soluble materials could be used to fabricate non-CO<sub>2</sub> soluble three dimensional structures, as DiSimone treats the existence of these structures as a given. Jus is completely silent with respect to this aspect of the invention.

Neither DeSimone nor Jur teach or suggests the steps of “creating voids” in a first layer, “removing material present in the voids”, “providing a layer of sacrificial material within at least a portion of said voids”, or “providing a second layer of photosensitive material on top of the layer of a sacrificial material and in contact with at least a portion of said first layer.” For each of these steps, the examiner again must rely exclusively on the teachings of Conlon. As has already been shown in the applicant’s comments above, Conlon in fact teaches away from the claimed method, as Conlon not only shows complete coverage with the sacrificial layer, but in fact requires complete coverage for the printed circuit boards of Conlon to operate successfully. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). Since neither DeSimone nor Jur teaches or suggests any of the features of the claims recited above, and since Conlon explicitly teaches away from those features as already discussed, the combination of DeSimone, Conlon and Jur cannot possibly form the basis for a *prima facie* showing of obviousness under 35 USC 103(a). Accordingly, the applicant respectfully requests that the examiner remove his rejection of claims 18-23 under 35 USC 103(a) as being obvious in view of Conlon (USP 5,035,939) in view of DeSimone (USP 6,298,902) and further in view of Jur (USP 6,558,475).

The examiner has rejected claim 1 under 35 USC 103(a) as being obvious in view of Conlon (USP 5,035,939) in view of Finter (USP 6,001,428) and further in view of DeSimone (USP 6,298,902). The examiner concedes that Conlon does not disclose the specific photosensitive material required in claim 1. However, the examiner argues that Finter’s use of triarylsulfonium hexafluoroantimonate with

diglycidyl ether of disphenol A provides such a teaching. Even if the two materials are considered equivalent, (which the applicant does not concede), the teaching of Finter is still insufficient to provide a basis for a *prima facie* case of obviousness under 35 USC 103(a), because Finter contains no teaching or suggestion whatsoever of how these materials might be used to form three dimensional microstructures. Finter neither teaches nor suggests the steps of “creating voids” in a first layer, “removing material present in the voids”, “providing a layer of sacrificial material within at least a portion of said voids”, or “providing a second layer of photosensitive material on top of the layer of a sacrificial material and in contact with at least a portion of said first layer.” For each of these steps, the examiner must rely exclusively on the teachings of Conlon.

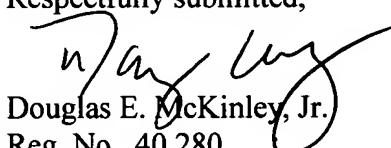
The examiner appears to suggest that DeSimone provides support for these steps. However, as already discussed, DeSimone treats the three dimensional structure of the non-CO<sub>2</sub> soluble material as a *given*. DeSimone offers no teaching or suggestion whatsoever as to how this three dimensional structure of non-CO<sub>2</sub> soluble material is first created. Instead, DiSimone simply assumes that it exists, and notes that it may then be used as a template in creating a corresponding structure made of DiSimone’s CO<sub>2</sub> soluble materials. For each of these steps, the examiner thus again must rely exclusively on the teachings of Conlon. As has already been shown in the applicant’s comments above, Conlon in fact teaches away from the claimed method, as Conlon not only shows complete coverage with the sacrificial layer, but in fact requires complete coverage for the printed circuit boards of Conlon to operate successfully. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

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Amdt. dated March 8, 2004  
Reply to Office action of September 12, 2003

Since neither Finter or DeSimone teach or suggest any of the features of the claims recited above, and since Conlon explicitly teaches away from those features as already discussed, the combination of DeSimone, Finter and Conlon cannot possibly form the basis for a prima facie showing of obviousness under 35 USC 103(a). Accordingly, the applicant respectfully requests that the examiner remove his rejection of claim 1 under 35 USC 103(a) as being obvious in view of Conlon (USP 5,035,939) in view of Finter (USP 6,001,428) and further in view of DeSimone (USP 6,298,902).

Applicant has made an earnest attempt to place the above referenced application in condition for allowance and action toward that end is respectfully requested. Should the Examiner have any further observations or comments, she is invited to contact the undersigned for resolution.

Respectfully submitted,

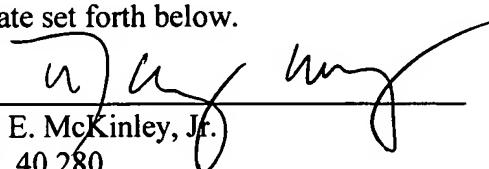
  
Douglas E. McKinley, Jr.  
Reg. No. 40,280

PO Box 202  
Richland, WA 99352  
Voice (509) 628-0809  
Fax (509) 628-2307

The undersigned hereby certifies that the forgoing Amendment dated March 6, 2004 in reply to the office action of September 12, 2003, together with a fee sheet (USPTO Form PTO/SB/17, and a return postcard, are being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to

Mail Stop Non-Fee Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

on the date set forth below.

  
Douglas E. McKinley, Jr.  
Reg. No. 40,280

March 8, 2004  
Date